

I. PATENT ABSTRACTS OF JAPAN

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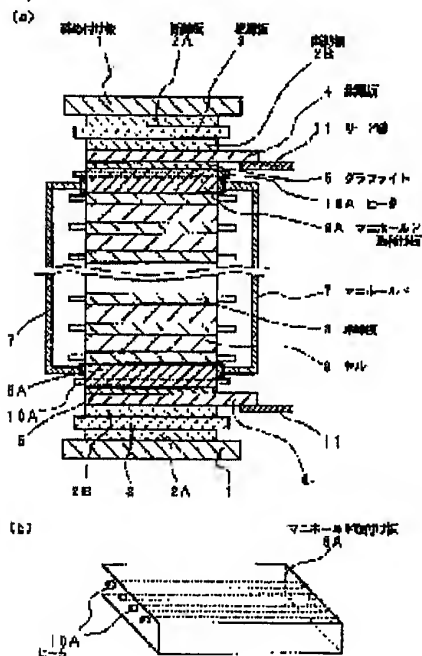
(21)Application number : 07-110385

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(54) LAMINATION TYPE FUEL CELL



(57)Abstract:

PURPOSE: To control a cell temperature by low power consumption at favorable precision at the time of shutdown.

CONSTITUTION: In a lamination type fuel cell, a manifold installation plate 6A for installing a manifold 7, a collector plate 4 to take out generated power, an insulation plate 3, and heat insulation plates 2A, 2B are disposed on each end of a fuel cell lamination body formed of cells 9 laminated with cooling plates 8, which are tightened by tightening plates 1. In this lamination type fuel cell, a heater 10A is embedded in the manifold installation plate 6A adjacent to the fuel cell lamination body in its lamination direction, and it is energized at the time of shutdown for heating and heat-insulating the cells 9 at a specified temperature.

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

another side using the manifold 7 and fuel gas is already passed from one side of the side of a lot to another side in this composition, Since electrochemical reaction arises in each of the cell 9 and direct current power arises between the collecting electrode plates 4 of a couple, it will be taken out outside with the lead 11 connected to the collecting electrode plate 4.

[0004] Since electrochemical reaction is an exoergic reaction, it cools by carrying out conduction of the refrigerant to the condenser tube laid under the cold plate 8 as mentioned above, and it holds a fuel cell layered product to a predetermined temperature, and is operated. Since generation of heat will stop if operation is suspended, the temperature of a fuel cell layered product will descend, but since the situations, such as producing the abnormalities of the electrolyte layer of the cell 9, will occur if temperature becomes low too much, also when operation is suspended, the method of holding more than prescribed temperature is taken. The heater 10 attached to the bolting board 1 of the laminating direction both ends of drawing 4 is used for this purpose, is thrown in at the time of shutdown, with the conductive heat, heats the cell 9 and holds it to prescribed temperature.

[0005]

[Problem(s) to be Solved by the Invention] As mentioned above, in the conventional lamination type fuel cell, the method of holding cell temperature more than prescribed temperature at the time of shutdown is taken by heating with the heater 10 attached to the bolting board 1.

However, in this method, the heater 10 for heating is arranged at the bolting board 1 of the both-ends side of a lamination type fuel cell, Since the heat insulation plate 2A, the electric insulating plate 3, heat insulation plate 2B, the collecting electrode plate 4, and the manifold-valve-mounting kick plate 6 intervene between the cells 9 of the fuel cell layered product of the controlled object of temperature, there is a difficulty that it is powerless. Namely, among the above, since heat transfer performance is low, especially the heat insulation plate 2A, the electric insulating plate 3, and heat insulation plate 2B, There is a problem that heating efficiency is bad since a control delay arises, and the problem that proper control cannot be performed is between the temperature of the heater 10 and the temperature of the cell 9 and the heater 10 is arranged at the outermost part, and great heating power is needed.

[0006] This invention was made in consideration of the above-mentioned problem, and that purpose is to provide the lamination type fuel cell which controls cell temperature by little power consumption with sufficient accuracy, and can hold it with it at the time of shutdown.

[0007]

[Means for Solving the Problem] In this invention in order to attain the above-mentioned purpose, A fuel cell layered product formed by making a cold plate intervene and laminating an electrode cell, A manifold-valve-mounting kick plate, a collecting electrode plate, an electric insulating plate, and a bolting board which are laminated one by one by both-ends side of the laminating direction, In a lamination type fuel cell which is provided with a manifold which is allotted to the side of a fuel cell layered product and is airtightly attached to a manifold-valve-mounting kick plate, carries out conduction of oxidant gas and the fuel gas to an electrode cell using a manifold, and takes out direct current power from a collecting electrode plate, For example, suppose laying a heater under the manifold-valve-mounting kick plate, and forming an incubation means etc. that it has a cell incubation means between a fuel cell layered product and a collecting electrode plate.

[0008]

[Function] If it has a cell incubation means like the above between the fuel cell layered product of a lamination type fuel cell, and a collecting electrode plate, Since a cell incubation means and a

fuel cell layered product approach, and the bad electric insulating plate or heat-insulating element of heat transfer performance does not intervene between them, when using this cell incubation means at the time of shutdown and heating a fuel cell layered product, and good heat transfer performance is obtained, the small temperature control of the range of fluctuation which was excellent in the response becomes possible. Since a cell incubation means is allotted to the inside of a laminating section unlike the former, without radiating heat directly outside, it can heat effectively and becomes a small quantity [necessary power consumption].

[0009]Since a cell incubation means will be adjoined and allotted to a fuel cell layered product if a heater is laid under the manifold-valve-mounting kick plate and it is especially considered as a cell incubation means, extremely outstanding temperature control can be performed and power consumption is also stopped by the **** small quantity.

[0010]

[Example]Hereafter, the example of this invention is described based on a drawing. Drawing 1 is an explanatory view of the example of the lamination type fuel cell of this invention, and drawing of longitudinal section in which (a) shows basic constitution, and (b) are the perspective views of the incorporated manifold-valve-mounting kick plate. In drawing 1 (a), the explanation which attaches identical codes and overlaps about the component parts which have the same function as the conventional lamination type fuel cell shown in drawing 4 is omitted.

[0011]The point of difference with the conventional example of this example is in arrangement of the heater used for incubation at the time of the shutdown of a lamination type fuel cell, and is included in the manifold-valve-mounting kick plate 6A by this example to having been attached to the outside surface of the bolting board 1 of both ends in the conventional example.

The heater 10A is allocated in the side hole which leaned toward the collecting electrode plate 4 side, and was horizontally provided in the manifold-valve-mounting kick plate 6A as shown in drawing 1 (b), and the cell incubation means is constituted.

[0012]Since the manifold-valve-mounting kick plate 6A adjoins the fuel cell layered product directly if the heater 10A is built into the manifold-valve-mounting kick plate 6A and it uses for the incubation at the time of shutdown like this composition, Without being barred by the electric insulating plate and heat insulation plate which intervene like before, the cell 9 can be heated effectively and it can be kept warm. Drawing 2 and drawing 3 are the perspective views showing other examples of the method of incorporating the heater to the manifold-valve-mounting kick plate in the lamination type fuel cell of this invention.

[0013]In [in the example of drawing 2, establish a slot in the near field of the collecting electrode plate 4 of the manifold-valve-mounting kick plate 6B, allocate the heater 10B, and constitute the cell incubation means, and] the example of drawing 3, After establishing a slot in the near field of the collecting electrode plate 4 of the manifold-valve-mounting kick plate 6C and allocating the heater 10C, the manifold-valve-mounting kick plate 6D is arranged on the upper part, the heater 10C is pinched, and the cell incubation means is constituted.

[0014]

[Effect of the Invention]As mentioned above, the fuel cell layered product formed by making a cold plate intervene and laminating an electrode cell in this invention, The manifold-valve-mounting kick plate, the collecting electrode plate, electric insulating plate, and bolting board which are laminated one by one by the both-ends side of the laminating direction, In the lamination type fuel cell which is provided with the manifold which is allotted to the side of a fuel cell layered product and is airtightly attached to a manifold-valve-mounting kick plate,

carries out conduction of oxidant gas and the fuel gas to an electrode cell using a manifold, and takes out direct current power from a collecting electrode plate, For example, it was presupposed to laying a heater under the manifold-valve-mounting kick plate, and forming an incubation means etc. that it has a cell incubation means between a fuel cell layered product and a collecting electrode plate.

Therefore, the lamination type fuel cell which is controlled by power consumption with little cell temperature with sufficient accuracy, and is held with it will be obtained at the time of shutdown.

TECHNICAL FIELD

[Industrial Application]In this invention, it is related with the lamination type fuel cell which supplies reactant gas to a fuel cell layered product, and obtains electric power.

Therefore, it is especially related with the insulation structure at the time of the shutdown.

PRIOR ART

[Description of the Prior Art]Drawing 4 is drawing of longitudinal section showing the basic constitution of this conventional kind of lamination type fuel cell. The cell 9 laminates the two or more layers single cell of the rectangular shape which pinches an electrolyte layer with an oxidizing agent pole and a fuel electrode, and is formed. The cold plate 8 which is laminated the cell 9 and by turns and forms the fuel cell layered product has played the role which removes generation of heat produced with power generation, and cools the cell 9 by carrying out conduction of the refrigerant to the condenser tube laid underground. The manifold 7 is arranged in each side of a fuel cell layered product, and it is airtightly attached to the manifold-valve-mounting kick plate 6 which uses as a substrate the carbon arranged on the both-ends side of the laminating direction of a fuel cell layered product. The collecting electrode plate 4 is built into the outside of the manifold-valve-mounting kick plate 6 via the graphite 5, and the bolting board 1 for binding tight and holding these layered products further is arranged on both sides of the electric insulating plate 3 for holding electric insulation, the heat insulation plate 2A for controlling a rise in heat, and 2B.

[0003]If oxidant gas is passed from one side of the side of the lot of a fuel cell layered product to another side using the manifold 7 and fuel gas is already passed from one side of the side of a lot to another side in this composition, Since electrochemical reaction arises in each of the cell 9 and direct current power arises between the collecting electrode plates 4 of a couple, it will be taken out outside with the lead 11 connected to the collecting electrode plate 4.

[0004]Since electrochemical reaction is an exoergic reaction, it cools by carrying out conduction of the refrigerant to the condenser tube laid under the cold plate 8 as mentioned above, and it holds a fuel cell layered product to a predetermined temperature, and is operated. Since generation of heat will stop if operation is suspended, the temperature of a fuel cell layered product will descend, but since the situations, such as producing the abnormalities of the electrolyte layer of the cell 9, will occur if temperature becomes low too much, also when operation is suspended, the method of holding more than prescribed temperature is taken. The heater 10 attached to the bolting board 1 of the laminating direction both ends of drawing 4 is

used for this purpose, is thrown in at the time of shutdown, with the conductive heat, heats the cell 9 and holds it to prescribed temperature.

EFFECT OF THE INVENTION

[Effect of the Invention]As mentioned above, the fuel cell layered product formed by making a cold plate intervene and laminating an electrode cell in this invention, The manifold-valve-mounting kick plate, the collecting electrode plate, electric insulating plate, and bolting board which are laminated one by one by the both-ends side of the laminating direction, In the lamination type fuel cell which is provided with the manifold which is allotted to the side of a fuel cell layered product and is airtightly attached to a manifold-valve-mounting kick plate, carries out conduction of oxidant gas and the fuel gas to an electrode cell using a manifold, and takes out direct current power from a collecting electrode plate, For example, it was presupposed to laying a heater under the manifold-valve-mounting kick plate, and forming an incubation means etc. that it has a cell incubation means between a fuel cell layered product and a collecting electrode plate.

Therefore, the lamination type fuel cell which is controlled by power consumption with little cell temperature with sufficient accuracy, and is held with it will be obtained at the time of shutdown.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]As mentioned above, in the conventional lamination type fuel cell, the method of holding cell temperature more than prescribed temperature at the time of shutdown is taken by heating with the heater 10 attached to the bolting board 1.

However, in this method, the heater 10 for heating is arranged at the bolting board 1 of the both-ends side of a lamination type fuel cell, Since the heat insulation plate 2A, the electric insulating plate 3, heat insulation plate 2B, the collecting electrode plate 4, and the manifold-valve-mounting kick plate 6 intervene between the cells 9 of the fuel cell layered product of the controlled object of temperature, there is a difficulty that it is powerless. Namely, among the above, since heat transfer performance is low, especially the heat insulation plate 2A, the electric insulating plate 3, and heat insulation plate 2B, There is a problem that heating efficiency is bad since a control delay arises, and the problem that proper control cannot be performed is between the temperature of the heater 10 and the temperature of the cell 9 and the heater 10 is arranged at the outermost part, and great heating power is needed.

[0006]This invention was made in consideration of the above-mentioned problem, and that purpose is to provide the lamination type fuel cell which controls cell temperature by little power consumption with sufficient accuracy, and can hold it with it at the time of shutdown.

MEANS

[Means for Solving the Problem]In this invention in order to attain the above-mentioned purpose, A fuel cell layered product formed by making a cold plate intervene and laminating an electrode cell, A manifold-valve-mounting kick plate, a collecting electrode plate, an electric insulating

plate, and a bolting board which are laminated one by one by both-ends side of the laminating direction, In a lamination type fuel cell which is provided with a manifold which is allotted to the side of a fuel cell layered product and is airtightly attached to a manifold-valve-mounting kick plate, carries out conduction of oxidant gas and the fuel gas to an electrode cell using a manifold, and takes out direct current power from a collecting electrode plate, For example, suppose laying a heater under the manifold-valve-mounting kick plate, and forming an incubation means etc. that it has a cell incubation means between a fuel cell layered product and a collecting electrode plate.

OPERATION

[Function]If it has a cell incubation means like the above between the fuel cell layered product of a lamination type fuel cell, and a collecting electrode plate, Since a cell incubation means and a fuel cell layered product approach, and the bad electric insulating plate or heat-insulating element of heat transfer performance does not intervene between them, when using this cell incubation means at the time of shutdown and heating a fuel cell layered product, and good heat transfer performance is obtained, the small temperature control of the range of fluctuation which was excellent in the response becomes possible. Since a cell incubation means is allotted to the inside of a laminating section unlike the former, without radiating heat directly outside, it can heat effectively and becomes a small quantity [necessary power consumption].

[0009]Since a cell incubation means will be adjoined and allotted to a fuel cell layered product if a heater is laid under the manifold-valve-mounting kick plate and it is especially considered as a cell incubation means, extremely outstanding temperature control can be performed and power consumption is also stopped by the **** small quantity.

EXAMPLE

[Example]Hereafter, the example of this invention is described based on a drawing. Drawing 1 is an explanatory view of the example of the lamination type fuel cell of this invention, and drawing of longitudinal section in which (a) shows basic constitution, and (b) are the perspective views of the incorporated manifold-valve-mounting kick plate. In drawing 1 (a), the explanation which attaches identical codes and overlaps about the component parts which have the same function as the conventional lamination type fuel cell shown in drawing 4 is omitted.

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insulating plate and heat insulation plate which intervene like before, the cell 9 can be heated effectively and it can be kept warm. Drawing 2 and drawing 3 are the perspective views showing other examples of the method of incorporating the heater to the manifold-valve-mounting kick plate in the lamination type fuel cell of this invention.

[0013]In [in the example of drawing 2, establish a slot in the near field of the collecting electrode plate 4 of the manifold-valve-mounting kick plate 6B, allocate the heater 10B, and constitute the cell incubation means, and] the example of drawing 3, After establishing a slot in the near field of the collecting electrode plate 4 of the manifold-valve-mounting kick plate 6C and allocating the heater 10C, the manifold-valve-mounting kick plate 6D is arranged on the upper part, the heater 10C is pinched, and the cell incubation means is constituted.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1](b) is drawing of longitudinal section in which (a) shows basic constitution in the explanatory view of the example of the lamination type fuel cell of this invention, and a perspective view of the incorporated manifold-valve-mounting kick plate.

[Drawing 2]The perspective view showing the 2nd example of the composition of the manifold-valve-mounting kick plate in the lamination type fuel cell of this invention

[Drawing 3]The perspective view showing the 3rd example of the composition of the manifold-valve-mounting kick plate in the lamination type fuel cell of this invention

[Drawing 4]Drawing of longitudinal section showing the basic constitution of this conventional kind of lamination type fuel cell

[Description of Notations]

1 Bolting board

2A and 2B Heat insulation plate

3 Electric insulating plate

4 Collecting electrode plate

6 and 6A manifold-valve-mounting kick plate

6B, 6C manifold-valve-mounting kick plate

7 Manifold

8 Cold plate

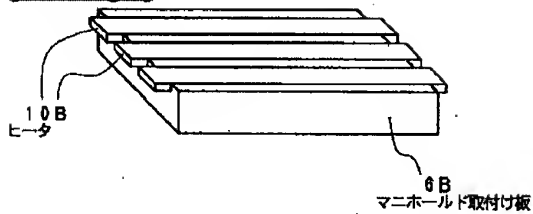
9 Cell

10 10A Heater

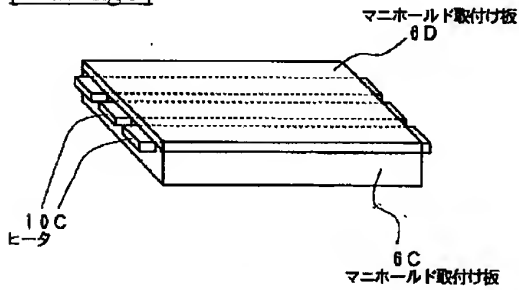
10B and 10C Heater

DRAWINGS

[Drawing 2]

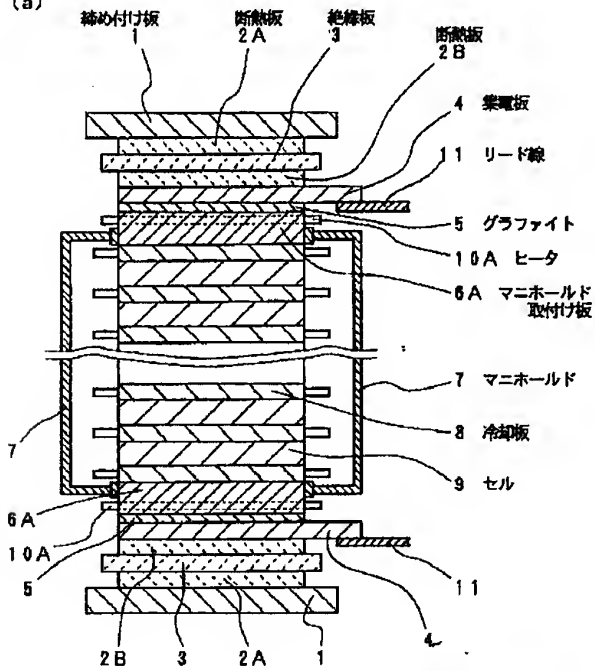


[Drawing 3]

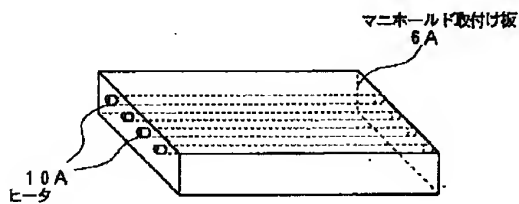


[Drawing 1]

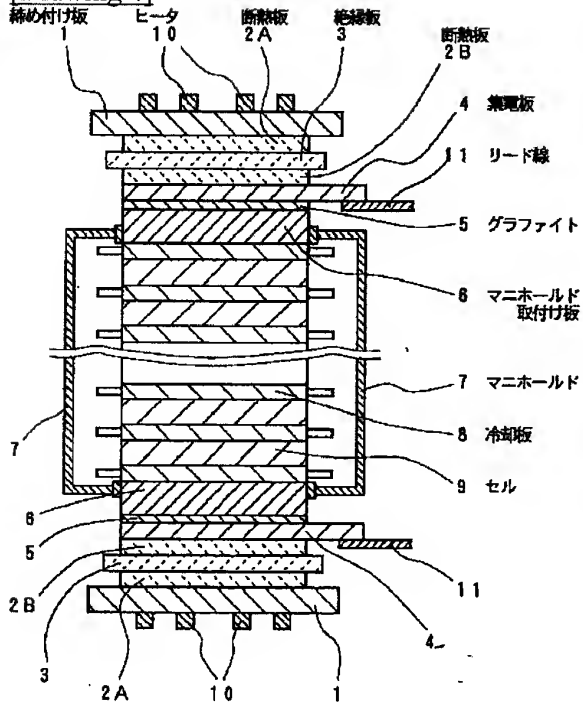
(a)



(b)



[Drawing 4]



[Translation done.]

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(57)Abstract:

CONSTITUTION: When operation is stopped, supply of methanol to a reformer 2 is stopped, and fuel gas supply and exhaust valves 3, 3' are closed. At the same time, an external exhaust valve 9 is opened, and the fresh air taken from an air introducing valve 8 is passed in a cooling line through an open passage to cool a cell 1, and also passed in a reaction air line to perge wet air within the cell. By the outside air flowing in a fuel line, a reaction air line, and the cooling line through open passages, the temperature of a cell falls, and when it fell to a specified value (about 120°C), a blower 5 is stopped, and supply and exhaust valves 11, 3', 4, 4', and 7, 7' in each line are closed, and the outside air is sealed in each line within the cell.